

## CLAIMS

What is claimed is:

- Sub 102
1. A method for fusing an optical fiber lens, comprising:  
injecting light into an optical fiber;  
5 detecting a diffraction pattern of the light exiting from a fiber lens at a proximal end  
of the optical fiber; and  
electro-fusing the fiber lens in response to the diffraction pattern.
  2. A method as claimed in claim 1, wherein the step of injecting the light into the  
10 optical fiber comprises energizing a laser that is coupled to distal end of the optical  
fiber.
  3. A method as claimed in claim 1, wherein the step of detecting the diffraction  
pattern comprises detecting a far-field diffraction pattern.
  4. A method as claimed in claim 1, wherein the step of detecting the diffraction  
15 pattern comprises positioning a two-dimensional detector optically in front of the fiber  
lens.
  5. A method as claimed in claim 1, further comprising analyzing a two-dimensional  
distribution of the diffraction pattern.
  6. A method as claimed in claim 5, wherein the step of analyzing the diffraction  
20 pattern comprised determining a ratio of a lateral size to a transverse size of the  
diffraction pattern.
  7. A method as claimed in claim 1, wherein the step of fusing the fiber lens comprises  
exposing the fiber lens to an electrical arc.

Sub 102  
~~8. A system for fusing an optical fiber lens, comprising:~~

a light source that injects light into an optical fiber;  
a detector that detects a diffraction pattern of the light exiting from a fiber lens at a proximal end of the optical fiber;  
an arc fuser that fuses the fiber lens; and  
5 a controller that activates the arc fuser in response to the diffraction pattern detected by the detector.

9. A system as claimed in claim 8, wherein the light source comprises a laser that is coupled to a distal end of the optical fiber.

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10 A system as claimed in claim 8, wherein the detector is positioned relative to the fiber lens to detect far-field diffraction pattern.

11. A system as claimed in claim 8, wherein the detector is positioned greater than 0.5 centimeters from the fiber lens.

12. A system as claimed in claim 8, wherein detector comprises a camera.

13. A system as claimed in claim 8, wherein the controller determines a two-dimensional distribution of the diffraction pattern.

14. A system as claimed in claim 8, wherein the controller determines a ratio of a lateral size to a transverse size of the diffraction pattern.

15. A system as claimed in claim 8, wherein the controller activates the arc fuser in a pulsed fashion until a desired diffraction pattern is detected by the detector.

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